North American Cargo Securement Standard

Draft Model Regulation

Draft 4

May 1999

Draft 4 - Notes:

At a meeting of the Standards Harmonization Committee held on May 8, 1999 a number of changes to Draft 3 of the proposed Model Regulation were endorsed. These included several important changes in proposed requirements, along with a number of editorial embellishments or corrections. The major changes included:

- **3.2 Dressed Lumber**: elimination of the distinction between covered and uncovered bundles; requirement for chain tiedowns on covered bundles removed.
- **3.4 Paper Rolls:** clarification of the requirements for bracing against tipping for eyes vertical rolls; clarification of the requirement for banding of eyes horizontal/crosswise rolls in upper tiers; elaboration of the securement requirements for transportation on flatbed vehicles
- **3.8 Heavy Vehicles, Equipment and Machinery**: elimination of the mandatory requirement to block against forward movement
- **3.10 Roll-on/Roll-off Containers:** Clarification of the requirement for blocking against forward movement
- **3.11 Large Boulders:** clarification of the application of this section to naturally formed boulders, not processed or formed rock

Other editorial changes introduced in Draft 4 are highlighted in yellow through the text which follows.

Table of Contents

Part 1 - Standard Application and Objectives

1.1 Application

Cargo carried by a motor vehicle with a gross vehicle weight, gross vehicle weight rating or gross combination weight rating in excess of 4500 kg (10,000 lb.) must be secured in accordance with the provisions of this standard when the vehicle is operated on a highway.

1.2 Requirement

Cargo must be contained or secured so that it *may* not, leak, spill, blow, fall from, fall through or otherwise become dislodged from the vehicle; or *swing* or shift upon or within the vehicle to such an extent that the vehicle's stability is adversely affected.

1.3 Performance Criteria

The cargo securement system must withstand the forces that result if the loaded vehicle is subjected separately to each of the following:

- 0.8 g deceleration in a forward direction;
- 0.5 g deceleration in a rearward direction;
- 0.5 g acceleration in either lateral direction.

If the cargo is not fully contained by the structure of the vehicle, the securement system must also provide a downward force equivalent to not less than 20% of the weight of the cargo. Under these conditions, applied separately, each component of the cargo securement system, including parts of the vehicle structure that react to any forces, must not exceed its rating or working load limit.

Part 2 - General Provisions and Requirements

2.1 Application

All devices used to secure cargo to a vehicle must conform to the requirements of this section.

2.1.1 Vehicle Structures and Anchor Points

Vehicle structures, floors, walls, decks, tiedown anchor points, headboards, bulkheads, stakes, posts and associated mounting pockets used to contain or secure cargo must be strong enough to withstand the forces which occur when the vehicle is subjected to the accelerations defined in Part 1.

All these must be in proper working order when used to secure cargo, with no obvious damage, distress, weakened parts or weakened sections.

A cab shield is not part of a cargo securement system.

2.1.2 Securement Method

The securement method chosen must be appropriate for the size, shape, strength and characteristics of the cargo being transported. Articles of cargo, including unitized articles, and articles stacked one upon another, must have sufficient structural integrity to withstand the forces of loading, securement and transportation.

All securing devices must be used in accordance with manufacturer's instructions.

2.1.3 Tiedowns

A tiedown, except for steel strapping, must be designed, constructed, and maintained so that the driver of the vehicle can tighten it. Each tiedown must be attached and secured in a manner that prevents it from becoming loose, unfastening, opening or releasing while the vehicle is in transit.

All components of a tiedown must be in proper working order, with *no knots* and no obvious damage, distress, weakened parts or weakened sections.

All tiedowns and other components of a cargo securement system must be located inboard of the rub rails when a platform body is equipped with such a device. This requirement does not apply when the width of the load extends to or beyond the rub rails.

Edge protection must be used where a tiedown would be subject to abrasion or cutting at the point where it touches an article of cargo. The edge protection must also resist abrasion, cutting and crushing.

2.1.4 Material for Dunnage, Chocks, Cradles, Blocking and Bracing

Timber used as dunnage, chocks, cradles, or for blocking or bracing, must be strong enough to withstand being split or crushed by the cargo or tiedowns.

2.1.5 Strength Rating for Blocking Systems

The aggregate working load limit of all components used to block an article against forward movement, including direct tiedowns, must be not less than one-half of the weight of the article being blocked.

2.1.6 Securement System Strength Rating

The Working Load Limit of a tiedown is the lowest working load limit of any of its components, or the working load limit of the anchor points to which it is attached, whichever is least. *In the case of a synthetic webbing tiedown, the working load limit is the working load limit of the tiedown assembly or the anchor point to which it is attached, whichever is least.*

A component *or assembly* marked by its manufacturer with a numeric working load limit shall be considered to have a working load limit equal to the marked value.

A component *or assembly* marked by its manufacturer in accordance with a recognized standard (Part 5) shall be considered to have a working load limit equal to the value provided by that standard.

A component *or assembly* which is unmarked by its manufacturer shall be considered to have a working load limit as described in Section 2.1.7.

2.1.7 Working Load Limits - Unmarked Components

Any securing device that is not marked by the manufacturer shall be considered to have a working load limit which is that of the lowest grade or classification for the type and size of the component, as provided in the tables in Part 6, with the following notations and/or exceptions:

Chain

Chain not marked by its manufacturer shall be considered to have a working load limit equal to an equivalent size Grade 3 Proof Coil as indicated in Table 6.1.

Synthetic Webbing

Synthetic webbing not marked by its manufacturer shall be considered to have a working load limit based on its width as provided in Table 6.2.

Wire rope

Wire rope not marked by its manufacturer with a working load limit shall be considered to have a working load limit based on its diameter as provided in Table 6.3.

Manila Rope

Manila rope not marked by its manufacturer with a working load limit shall be considered to have a working load limit based on its diameter as provided in Table 6.4.

Synthetic Cordage

Polypropylene fibre rope, polyester fibre rope, nylon rope and double braided nylon rope not marked by its manufacturer with a working load limit shall be considered to have a working load limit based on its diameter as provided in Table 6.5.

Synthetic cordage which is not marked or labeled to enable its identification of its composition or working load limit shall be considered to have a working load limit based on its diameter as provided in Table 6.5.

Steel Strapping

Steel strapping not marked by its manufacturer with a working load limit shall be considered to have a working load limit based on its width as provided in Table 6.6. Steel strapping that is one inch wide or wider must have at least two pairs of crimps in each seal and when an end-over-end lap joint is formed, it must be sealed with at least two seals.

Friction Mats

A friction mat shall be considered to provide resistance to horizontal movement equal to 50% of the weight of the cargo resting upon the mat.

2.2 General Cargo Securement Requirements

2.2.1 Application

The rules in this section apply to the transportation of all types of cargo, including those addressed in Part 3. However, when additional securement requirements are given for a commodity listed in Part 3, the specific requirements of that part take precedence over the general requirements of this part.

Cargo that is fully contained within a vehicle of adequate strength is deemed to comply with the requirements of Part 1.

Cargo that is immobilized within a vehicle by structures of adequate strength to prevent it from shifting and tipping is also deemed to comply with the requirements of Part 1.

All other cargo must be immobilized on or within a vehicle by appropriate means, secured by tiedowns, or a combination of these, to prevent shifting and tipping.

2.2.2 Cargo Placement and Restraint

Articles of cargo placed beside each other and secured by transverse indirect tiedowns must either:

- be placed in direct contact with each other, or
- a means must be provided to prevent them from shifting towards each other while in transit.

Articles of cargo with a tendency to roll must be restrained by chocks, wedges, a cradle or other equivalent means that prevent rolling. The means of preventing rolling must not be capable of becoming unintentionally unfastened or loose while the vehicle is in transit.

2.2.3 Aggregate Working Load Limit for Tiedowns

The aggregate working load limit of all tiedowns securing an article or group of articles must not be less than half the weight of the article or articles secured.

This requirement applies to transportation of all commodities, except where different requirements are prescribed for specific commodities in Part 3.

2.2.4 Direct Tiedowns

A direct tiedown providing resistance against longitudinal movement must make an angle no more than 45 degrees with the horizontal when viewed from the side of the vehicle. A direct tiedown providing resistance against lateral movement must make an angle no more than 45 degrees with the horizontal when viewed from the front or rear of the vehicle.

For the purposes of calculation, the aggregate working load limit of all direct tiedowns used to restrain articles is based on the sum of:

- One-half of the working load limit of each direct tiedown that is connected between the vehicle and the article of cargo
- The working load limit of each direct tiedown that is attached to the vehicle, passes through or around an article of cargo, or is attached to it, and then is again attached to the vehicle.

2.2.5 Indirect Tiedowns

An indirect tiedown providing resistance against longitudinal movement must make an angle no less than 30 degrees with the horizontal when viewed from the front or rear of the vehicle. An indirect tiedown providing resistance against lateral movement must make an angle no less than 30 degrees with the horizontal when viewed from the side of the vehicle

Each indirect tiedown which passes over an article will be considered to be one tiedown.

For the purposes of calculation, the aggregate working load limit of all indirect tiedowns used to restrain articles is based on the sum of the working load limits of each indirect tiedown.

2.2.5.1 Minimum Number of Indirect Tiedowns Required

When an individual article is not blocked or immobilized to prevent movement in the forward direction by a headboard, bulkhead, other cargo which is also immobilized, or other appropriate blocking device, it must be secured by *at least*:

- One tiedown for articles up to 1.52 m (5 ft) in length and up to 500 kg (1100 lb.) in weight

- Two tiedowns if the article is:
  - up to 1.52 m (5 ft) in length but over 500 kg (1100 lb.) in weight
  - longer than 1.52 m (5 ft) but less than or equal to 3.04 m (10 ft) in length
- Two tiedowns if the article is longer than 3.04 m (10 ft), and one additional tiedown for every additional 3.04 m (10 ft) of article length, or part thereof, beyond the first 3.04 m (10 ft) of length.

When an individual article is blocked or immobilized to prevent movement in the forward direction by a headboard, bulkhead, other articles which are adequately secured or by an appropriate blocking or immobilizing method, it must be secured by ***at least*** one tiedown for every 3.04 meters (10 feet) of article length, or fraction thereof.

The preceding requirements apply to transportation of all commodities, except where different requirements are prescribed for specific commodities in Part 3.

2.3 Inspection of Securement Systems

The driver of a vehicle:

- must inspect the cargo and its securing devices within the first 80 km (50 miles) after beginning a trip, and must cause any adjustments to be made to the cargo or securing devices as may be necessary, including adding additional securing devices, to maintain the security of the cargo; and
- must re-examine the cargo and its securing devices periodically during the trip, and must cause any adjustments to be made to the cargo or securing devices as may be necessary, including adding additional securing devices, to maintain the security of the cargo. A periodic reexamination and any necessary adjustments must be made:
  - when the duty status of the driver changes; or
  - after the vehicle has been driven for 3 hours; or 240 km (150 miles), whichever occurs first.

While the safety and security of cargo while in transit is of paramount concern, a driver of a vehicle will not be required to conduct the preceding periodic inspections if:

- the vehicle is sealed, and the driver has been ordered not to open it to inspect its cargo, or
- the vehicle has been loaded in a manner that makes inspection of its cargo impractical.

Part 3 - Specific Securement Requirements by Commodity Type

3.1 Logs

3.1.1 Application

Logs that are unitized by banding or other equivalent means, or not more than four fully processed logs, ***may*** be transported in accordance with the provisions of Part 2 of this standard.

Firewood, stumps, log debris and other such short logs must be transported in a vehicle or container enclosed on all sides and of adequate strength to contain them. Longer logs may also be so loaded.

This section applies to transportation of all other logs.

A stack of logs that is composed of both shortwood and longwood must be treated as shortwood.

3.1.2 Components of a Securement System

Logs must be transported on a vehicle designed and built, or adapted, for transportation of logs.

Any such vehicle must be fitted with bunks, bolsters, stakes or standards, or other equivalent means, that cradle the logs and prevent them from rolling.

All vehicle components involved in securement of logs must be designed and built to withstand all anticipated operational forces without failure, accidental release or permanent deformation.

Stakes or standards that are not permanently attached to the vehicle must be secured in a manner that prevents unintentional separation from the vehicle in transit.

Tiedowns must be used in combination with the stabilization provided by bunks, stakes or standards and bolsters to secure the load.

Any tiedown must have a working load limit not less than 1,800 kg (4,000 lb).

A tiedown must be tensioned as tightly as possible, but not beyond its working load limit.

3.1.3 Application of a Securement System

Logs must be solidly packed, and the outer bottom logs must be in contact with and resting solidly against stakes.

Each outside log must touch at least two stakes, but if one end does not actually touch a stake, it must rest on other logs in a stable manner and must extend beyond the end of the stake.

The center of the highest outside log on each side or end must be below the top of each stake.

Each log that is not held in place by contact with other logs or the stakes must be held in place by an indirect tiedown.

All tiedowns must be tightened at initial loading. The load and all tiedowns must be checked, and adjusted as necessary, at entry onto a public road, in addition to the intervals specified in section 2.3.

Additional tiedowns or securement devices must be used when the species or condition of wood results in such low friction between logs that they are likely to slip upon each other.

3.1.3.1 Frame ***Vehicle(s)***

Shortwood loaded lengthwise must be cradled in a bunk unit, and must be secured to the vehicle by at least two indirect tiedowns.

Longwood must be cradled in two or more bunks, and must be secured to the vehicle by at least two indirect tiedowns at locations along the load that provide effective securement. The aggregate working load limit for all tiedowns securing a stack of logs must be no less than one-sixth the weight of the stack of logs.

Shortwood loaded crosswise must be secured in the same manner as required for rail trucks and trailers.

3.1.3.2 Rail ***Vehicle(s)***

Logs in the bottom tier of shortwood loaded crosswise must be supported by vehicle structure within 30 cm (12 inches) of each end.

One stack of shortwood loaded crosswise must be secured with at least two indirect tiedowns. These must attach to the vehicle frame at the front and rear of the load, and must cross the load lengthwise. Where two indirect tiedowns are used, they must be positioned about one-third of the logs length in from

each end of the logs.

A rail *vehicle* over 10 m (33 feet) long must be fitted with center stakes to divide it into two sections about equal in length.

Where a *vehicle* is so divided, each tiedown must secure the highest log *on* each side of the centre stake, and must be fastened below these logs. It may be fixed at each end and tensioned from the middle, or fixed in the middle and tensioned from each end, or may pass through a pulley or equivalent in the middle and be tensioned from one end. Any structure or stake that is subjected to an upward force when the tiedowns are tensioned must be anchored to resist that force.

If two stacks of shortwood can fit side-by-side within the allowable width, they may be so loaded, provided:

- there is no space between the two stacks of logs;
- the outside of each stack is raised *at least* 2.5 cm (1 in) within 10 cm (4 in) of the end of the logs or the side of the vehicle;
- the highest log is no more than 2.44 m (8 ft) above the deck; and
- at least one tiedown is used lengthwise across each stack of logs

A vehicle built after (*effective date of standard plus grace period*) must tension each tiedown with a device that maintains a tension not less than 900 kg (2,000 lb) at all times, and automatically takes up slack in the tiedown as the logs settle.

3.1.3.3 Flatbed *Vehicle(s)*

Shortwood loaded crosswise must be secured in the same manner as required for rail *vehicle(s).*

Shortwood loaded lengthwise must be contained by stakes. Each stack of logs must be secured by at least two indirect tiedowns. However, if all logs in any stack are blocked in the front by a headboard strong enough to restrain the load, or another stack of logs, and blocked in the rear by another stack of logs or vehicle end structure**,** the stack may be secured with one tiedown. If one tiedown is used, it must be about midway between the stakes.

Longwood loaded lengthwise must be contained by stakes. The aggregate working load limit for all tiedowns must be no less than one sixth the weight of the stack logs. Each outside log must be secured by at least two indirect tiedowns.

3.1.3.4 Pole trailers

The load must be secured by at least one tiedown at each bunk, or alternatively, by at least two tiedowns used as wrappers that encircle the entire load at locations along the load that provide effective securement. The most extreme wrappers must be at least 3.04 meters (10 feet) apart.

Large diameter single and double log loads must be immobilized with chock blocks or other equivalent means to prevent shifting.

Large diameter logs that rise above stakes must be secured to the underlying load with at least two additional wrappers.

3.2 Dressed Lumber

3.2.1 Application

The rules in this part apply to the transportation of bundles of dressed lumber, packaged lumber, building products such as plywood, gypsum board or other materials of similar shape.

Lumber or building products which are not bundled or packaged should be treated as loose items and transported in accordance with the provisions of Part 2 of this standard.

3.2.2 Securement of Bundles

For the purpose of this section, "bundle" refers to packages of lumber, building materials or similar products which are unitized for securement as a single item of cargo.

Bundles must be placed side by side in direct contact with each other, or a means must be provided to prevent bundles shifting towards each other.

Bundles carried on one tier must be secured in accordance with the general provisions of the standard (section 2.2.5).

Bundles carried in more than one tier must be either:

a) blocked against lateral movement by stakes on the sides of the vehicle and secured by indirect tiedowns laid out over the top tier, as outlined in the general provisions of the standard (section 2.2.5), or

b) restrained from lateral movement by blocking or high friction devices between tiers and secured by indirect tiedowns laid out over the top tier, as outlined in the general provisions of the standard (section 2.2.5), or

c) placed directly on top of other bundles or on spacers of adequate size and orientation. The length of spacers between bundles must provide support to all pieces in the bottom row of the bundle. The width of individual spacers must be greater than the height. Spacers must provide good interlayer friction. If spacers are comprised of layers of material, the layers must be unitized or fastened together in a manner which ensures that the spacer performs as a single piece of material. The resulting stack of bundles must be:

    - secured by indirect tiedowns over the second tier of bundles, or at 1.85 m (6 ft) above the trailer deck, whichever is greater, or not over 1.85 m (6 ft) above the trailer deck for other multiple tiers in accordance with the general provisions of the standard (section 2.2.5); and

    - secured by indirect tiedowns over the top tier of bundles, in accordance with the general provisions of the standard (section 2.2.5) with a minimum of two indirect tiedowns for bundle(s) longer than 1.52 m (5 ft); or

d) secured by indirect tiedowns laid out over each tier of bundles, in accordance with the general provisions of the standard (section 2.2.5) with a minimum of two indirect tiedowns over each top bundle(s) longer than 1.52 m (5 ft), in all other circumstances.

3.3 Metal Coils

3.3.1 Application

The rules in this section apply to the transportation of one or more metal coils which, individually or together, weigh 2268 kg (5000 pounds) or more.

Shipments of metal coils that weigh less than 2268 kg (5000 pounds) may be secured in accordance with the provisions of Part 2 of this standard.

3.3.2 Coils With Eyes Vertical on a Flatbed Vehicle, in a *Sided* Vehicle or Intermodal Container with Anchor Points

3.3.2.1 An Individual Coil

Tiedowns must be arranged in a manner to prevent the coils from tipping in the forward, rearward, and lateral directions. The restraint system must include:

1. At least one indirect tiedown attached diagonally from the left side of the vehicle or intermodal container (near the forward-most part of the coil), across the eye of the coil, to the right side of the vehicle or intermodal container (near the rearmost part of the coil);
2. At least one indirect tiedown attached diagonally from the right side of the vehicle or intermodal container (near the forward-most part of the coil), across the eye of the coil, to the left side of the vehicle or intermodal container (near the rearmost part of the coil);
3. At least one indirect tiedown attached transversely over the eye of the coil;
4. Either blocking and bracing, *friction mats* or direct tiedowns must be used to prevent longitudinal movement in the forward direction.

3.3.2.2 Coils Grouped in Rows

For vehicles transporting coils which are grouped and loaded side by side in a transverse or longitudinal row, the coils must be secured by:

1. At least one direct tiedown against the front of the row of coils, restraining against forward motion, and making an angle no more than 45 degrees with the floor of the vehicle or intermodal container when viewed from the side of the vehicle or container;
2. At least one direct tiedown against the rear of the row of coils, restraining against rearward motion, and making an angle no more than 45 degrees with the floor of the vehicle or intermodal container when viewed from the side of the vehicle or container; and
3. At least one indirect tiedown over the top of each coil or transverse row of coils, restraining against vertical motion. Indirect tiedowns going over the top of a coil(s) must be as close as practicable to the eye of the coil and positioned to prevent the tiedown from slipping or becoming unintentionally unfastened while the vehicle is in transit.
4. Direct tiedowns, blocking or bracing must be arranged to prevent shifting or tipping in the forward, rearward and lateral directions.

3.3.3 Coils With Eyes Crosswise on a Flatbed Vehicle, in a *Sided* Vehicle or Intermodal Container with Anchor Points

3.3.3.1 An Individual Coil

The coil must be secured by:

1. A means (e.g., timbers, chocks or wedges, a cradle, etc.) to prevent the coil from rolling. The means of preventing rolling must support the coil off the deck, and must not be capable of becoming unintentionally unfastened or loose while the vehicle is in transit. If timbers, chocks or wedges are used, they must be held in place by coil bunks or similar devices to prevent them from coming loose. The use of nailed blocking or cleats as the sole means to secure timbers, chocks or wedges, or a nailed wood cradle, is prohibited.

2. At least one direct tiedown through its eye, restricting against forward motion, and making an angle no more than 45 degrees with the floor of the vehicle or intermodal container when viewed from the side of the vehicle or container;

3. At least one direct tiedown through its eye, restricting against rearward motion, and making an angle no more than 45 degrees with the floor of the vehicle or intermodal container when viewed from the side of the vehicle or container.

3.3.3.2 Prohibition on Crossing of Chains When Coils are Transported with Eyes Crosswise

Attaching direct tiedowns diagonally through the eye of a coil to form an X-pattern when viewed from above the vehicle is prohibited.

3.3.4 Coils With Eyes Lengthwise on a Flatbed Vehicle, in a *Sided* Vehicle or Intermodal Container with Anchor Points

3.3.4.1 An Individual Coil - Option 1

The coil must be secured by:

1. A means (e.g., timbers, chocks or wedges, a cradle, etc.) to prevent the coil from rolling. The means of preventing rolling must support the coil off the deck, and must not be capable of becoming unintentionally unfastened or loose while the vehicle is in transit. If timbers, chocks or wedges are used, they must be held in place by coil bunks or similar devices to prevent them from coming loose. The use of nailed blocking or cleats as the sole means to secure timbers, chocks or wedges, or a nailed wood cradle, is prohibited.

2. At least one direct tiedown attached diagonally through its eye from the left side of the vehicle or intermodal container (near the forward-most part of the coil), to the right side of the vehicle or intermodal container (near the rearmost part of the coil), making an angle no more than 45 degrees with the floor of the vehicle or intermodal container when viewed from the side of the vehicle or container;

3. At least one direct tiedown attached diagonally through its eye, from the right side of the vehicle or intermodal container (near the forward-most part of the coil), to the left side of the vehicle or intermodal container (near the rearmost part of the coil), making an angle no more than 45 degrees with the floor of the vehicle or intermodal container when viewed from the side of the vehicle or container;

4. At least one indirect tiedown transversely over the top of the coil;

5. Either blocking, or friction mats to prevent longitudinal movement in the forward direction.

3.3.4.2 An Individual Coil - Option 2

The coil must be secured by:

1. A means (e.g., timbers, chocks or wedges, a cradle, etc.) to prevent the coil from rolling. The means of preventing rolling must support the coil off the deck, and must not be capable of becoming unintentionally unfastened or loose while the vehicle is in transit. If timbers, chocks or wedges are used, they must be held in place by coil bunks or similar devices to prevent them from coming loose. The use of nailed blocking or cleats as the sole means to secure timbers, chocks or wedges, or a nailed wood cradle, is prohibited.

2. At least one direct tiedown attached straight through its eye from the left side of the vehicle or intermodal container (near the forward-most part of the coil), to the left side of the vehicle or intermodal container (near the rearmost part of the coil), making an angle no more than 45 degrees with the floor of the vehicle or intermodal container when viewed from the side of the vehicle or container;

3. At least one direct tiedown attached straight through its eye, from the right side of the vehicle or intermodal container (near the forward-most part of the coil), to the right side of the vehicle or intermodal container (near the rearmost part of the coil), making an angle no more than 45 degrees with the floor of the vehicle or intermodal container when viewed from the side of the vehicle or container;

4. At least one indirect tiedown transversely over the top of the coil;

5. Either blocking, or friction mats to prevent longitudinal movement in the forward direction.

3.3.4.3 An Individual Coil - Option 3

The coil must be secured by:

1. A means (e.g., timbers, chocks or wedges, a cradle, etc.) to prevent the coil from rolling. The means of preventing rolling must support the coil off the deck, and must not be capable of becoming unintentionally unfastened or loose while the vehicle is in transit. If timbers, chocks or wedges are used, they must be held in place by coil bunks or similar devices to prevent them from coming loose. The use of nailed blocking or cleats as the sole means to secure timbers, chocks or wedges, or a nailed wood cradle, is prohibited.

2. At least one indirect tiedown over the top of the coil, located near the forward-most part of the coil;

3. At least one indirect tiedown over the top of the coil located near the rearmost part of the coil;

4. Either blocking or friction mats to prevent longitudinal movement in the forward direction.

3.3.4.4 Rows of Coils

A transverse row of coils having approximately equal outside diameters must be secured with:

1. A means (e.g., timbers, chocks or wedges, a cradle, etc.) to prevent *each coil in the row of coils* from rolling. The means of preventing rolling must support each coil off the deck, and must not be capable of becoming unintentionally unfastened or loose while the vehicle is in transit. If timbers, chocks or wedges are used, they must be held in place by coil bunks or similar devices to prevent them from

coming loose. The use of nailed blocking or cleats as the sole means to secure timbers, chocks or wedges, or a nailed wood cradle, is prohibited.

2. At least two indirect tiedowns over the top of each coil or transverse row; and

3. Either blocking, bracing or friction mats to prevent longitudinal movement in the forward direction for each coil

3.3.5 Coils in a *Sided* Vehicle or Intermodal Container Without Anchor Points

Metal coils must be loaded in a manner to prevent shifting and tipping. The coils must be secured to prevent lateral and longitudinal movement and tipping by the use of friction mats, or a system of blocking and bracing or tiedowns and either blocking and bracing.

3.4 Paper Rolls

3.4.1 Application

The rules in this part apply to shipments of paper rolls which, individually or together, weigh 2268 kg (5000 lb) or more.

Shipments of paper rolls that weigh less than 2268 kg (5000 lb), and paper rolls that are unitized on a pallet, may either be secured in accordance this section or with the provisions of Part 2 of this standard.

3.4.2 Paper Rolls Loaded With Eyes Vertical in a Sided Vehicle

Paper rolls must be placed tightly against the front and walls of the vehicle, other paper rolls, or other cargo, for mutual support in transit.

If there are insufficient paper rolls in the shipment to reach the walls of the vehicle, lateral movement must be prevented by filling the void, blocking, bracing, tiedowns or friction mats. The paper rolls may also be banded together.

When any void behind a group of paper rolls, including that at the rear of the vehicle, exceeds the diameter of the paper rolls, rearward movement must be prevented by friction mats, blocking, bracing, tiedowns, or banding to other rolls.

If a paper roll is not prevented from tipping or falling sideways or rearwards *by vehicle structure or other cargo*, and its width is more than 2 times its diameter, it must be prevented from tipping or falling by banding it to other rolls, bracing, or tiedowns.

If the forwardmost roll(s) in a group of paper rolls is not prevented from tipping or falling forwards by vehicle structure or other cargo and it is restrained against forward movement by friction mat(s) alone, and its width is more than 1.75 times its diameter,it must be prevented from tipping or falling forwards by banding it to other rolls, bracing, or tiedowns. Otherwise, when a paper roll or the forwardmost roll in groups of rolls that are not prevented from tipping or falling forwards by vehicle structure or other cargo and its width exceeds 1.25 times its diameter it must be prevented from tipping or falling by banding to other rolls, bracing or tiedowns.

If paper rolls are banded together, the rolls must be placed tightly against each other to form a stable group. The bands must be applied tightly, and must be secured so that they cannot fall off the rolls or to the deck.

A friction mat used to provide the principal securement for a paper roll must protrude from beneath the

roll in the direction in which it is providing that securement.

Split Loads

If a paper roll in a split load is not prevented from forward movement by vehicle structure or other cargo, it must be prevented from forward movement by filling the open space, or by blocking, bracing, tiedowns, friction mats, or some combination of these.

Stacked Loads

Paper rolls must not be loaded on a layer beneath unless that layer extends to the front of the vehicle.

Paper rolls in the second and subsequent layers must be prevented from forward, rearward or lateral movement by means as allowed for the bottom layer, or by use of a blocking roll from a lower layer. The blocking roll must be at least 50 mm (2 in) taller than other rolls, or must be raised at least *38 mm (1.5 in)* using dunnage. A roll in the rearmost row of any layer must not be raised using dunnage.

3.4.3 Paper Rolls Loaded With Eyes Horizontal and Crosswise in a Sided Vehicle

The paper rolls must be prevented from rolling or shifting longitudinally by contact with vehicle structure or other cargo, by chocks, wedges or blocking and bracing of adequate size, or by tiedowns. Chocks, wedges or blocking must be held securely in place by some means in addition to friction, so they cannot become unintentionally unfastened or loose while the vehicle is in transit.

The rearmost roll must not be secured using the rear doors of the vehicle or intermodal container, or by blocking held in place by those doors.

If there is more than a total of 203 mm (8 in) of space between the ends of a paper roll, or a row of rolls, and the walls of the vehicle, void fillers, blocking, bracing, friction mats, or tiedowns must be used to prevent the roll from shifting towards either wall.

Stacked Loads

Rolls must not be loaded in a second layer unless the bottom layer extends to the front of the vehicle. Rolls must not be loaded in a higher layer unless all wells in the layer beneath are filled.

The foremost roll in each upper layer, or any roll with an empty well in front of it, must be secured against forward movement by:

- banding it to other rolls, or
- *blocking against an adequately secured eye-vertical blocking roll resting on the floor of the vehicle which is at least 1.5 times taller than the diameter of the roll being blocked, or*
- *placing it in a well formed by two rolls on the lower row whose diameter is equal to or greater than that of the roll on the upper row*

The rearmost roll in each upper layer must be secured by banding it to other rolls *if it is located in either of the last two wells formed by the rearmost rolls in the layer below*.

Rolls must be secured against lateral movement by the same means allowed for the bottom layer when there is more than a total of 203 mm (8 in) of space between the ends of a paper roll, or a row of rolls, and the walls of the vehicle.

3.4.4 Paper Rolls Loaded With the Eyes Horizontal and Lengthwise in a Sided Vehicle

Each roll must be prevented from forward movement by contact with vehicle structure, other cargo, blocking or tiedowns.

Each roll must be prevented from rearward movement by contact with other cargo, blocking, friction mats or tiedowns.

The paper rolls must be prevented from rolling or shifting laterally by contact with the wall of the vehicle or other cargo, or by chocks, wedges or blocking of adequate size. Chocks, wedges or blocking must be held securely in place by some means in addition to friction, so they cannot become unintentionally unfastened or loose while the vehicle is in transit.

Stacked Loads

Rolls must not be loaded in a higher layer if another roll will fit in the layer beneath.

An upper layer must be formed by placing paper rolls in the wells formed by the rolls beneath.

A roll in an upper layer must be secured against forward and rearward movement by any of the means allowed for the bottom layer, by use of a blocking roll, or by banding to other rolls.

3.4.5 Paper Rolls Loaded on a Flatbed Vehicle *or in a Curtain Sided Vehicle*

3.4.5.1 Paper Rolls with Eyes Vertical or with Eyes Horizontal and Lengthwise

The paper rolls must be loaded and secured as described for a sided vehicle, and the entire load must be secured by tiedowns in accordance with the provisions of Part 2 of this standard.

Stacked loads of paper rolls with eyes vertical are prohibited.

3.4.5.2 Paper Rolls with Eyes Horizontal and Crosswise

The paper rolls must be prevented from rolling or shifting longitudinally by contact with vehicle structure or other cargo, by chocks, wedges or blocking and bracing of adequate size, or by tiedowns. Chocks, wedges or blocking must be held securely in place by some means in addition to friction so that they cannot become unintentionally unfastened or loose while the vehicle is in transit.

Transverse or longitudinal tiedowns must be used to prevent lateral movement.

3.5 Concrete Pipe

3.5.1 Application

The rules in this section apply to the transportation of concrete pipe on a platform trailer or vehicle.

Concrete pipe bundled tightly together into a single rigid article that has no tendency to roll, and concrete pipe loaded in a sided vehicle or container must be secured in accordance with the provisions of Part 2 of this standard.

Other concrete pipe loaded transversely on a vehicle must be secured in accordance with this section.

3.5.2 Tiedowns

The aggregate working load limit of all tiedowns on any group of pipe must not be less than half the total

weight of all pipe in the group.

3.5.3 Blocking

Blocking may be one or more pieces placed symmetrically about the center of a pipe. One piece must extend at least half the distance from the center to each end of the pipe, and two pieces must be placed at the outside quarter points. Blocking must be placed firmly against the pipe, and must be secured to prevent it moving out from under the pipe. Timber blocking must have a minimum nominal dimension of at least 10 x 15 cm (4 x 6 in).

3.5.4 Arranging the Load

3.5.4.1 Pipe of Different Diameter

If pipe of more than one diameter are loaded on a vehicle, groups must be formed that consist of pipe of only one size, and each group must be separately secured.

3.5.4.2 The bottom tier

The bottom tier must be arranged to cover the full length of the vehicle, or as a partial tier in one group or two groups.

3.5.4.3 An upper tier

Pipe must be placed only in the wells formed by adjacent pipes in the tier beneath. An upper tier must not be started unless all wells in the tier beneath are filled.

3.5.4.4 The top tier

The top tier must be arranged as a complete tier, a partial tier in one group, or a partial tier in two groups.

3.5.4.5 Bell Pipe

Bell pipe must be loaded on at least two longitudinal spacers of sufficient height to ensure that the bell is clear of the deck. Bell pipe loaded in one tier must have the bells alternating on opposite sides of the vehicle. The ends of consecutive pipe must be staggered, if possible within the allowable width, otherwise they must be aligned.

Bell pipe loaded in more than one tier must have the bells of the bottom tier all on the same side of the vehicle. Pipe in every upper tier must be loaded with bells on the opposite side of the vehicle to the bells of the tier below.

If the second tier is not complete, pipe in the bottom tier which do not support a pipe above must have their bells alternating on opposite sides of the vehicle.

3.5.5 Securing Pipe with an Inside Diameter up to 1143 mm (45 in)

3.5.5.1 Stabilizing the bottom tier

The bottom tier must be contained longitudinally at each end by blocking, vehicle end structure, stakes, a locked pipe unloader, or other equivalent means. Other pipe in the bottom tier may also be held in place by blocks and/or wedges.

Every pipe in the bottom tier must also be held firmly in contact with the adjacent pipe by direct tiedowns though the front and rear pipes. The direct tiedown on the front pipe of the bottom tier must run aft at an

angle not more than 45 degrees with the horizontal. The direct tiedown on the rear pipe of the bottom tier must run forward at an angle not more than 45 degrees with the horizontal.

3.5.5.2 Tiedowns

Direct tiedowns through the pipe must be chains. Longitudinal indirect tiedowns may be chain or wire rope. Pipe may be secured individually with a direct tiedown through the pipe. A direct tiedown through a pipe in an upper tier is considered to secure all those pipe beneath on which that tiedown causes pressure.

If each pipe is not secured individually with a tiedown, then:

- Two indirect tiedowns must be placed longitudinally over the group of pipes;
- One transverse tiedown (direct or indirect) must be used for every 3.0 m (10 ft) of load length. The transverse tiedowns may be placed through a pipe, or over both longitudinal tiedowns between two pipes on the top tier.

If the first pipe of a group in the top tier is not at the front of the tier beneath, it must be secured by an additional direct tiedown that runs rearward at an angle not more than 45 degrees to the horizontal. This direct tiedown must pass either through the front pipe of the upper tier, or outside it and over both longitudinal indirect tiedowns.

If the last pipe of a group in the top tier is not at the rear of the tier beneath, it must be secured by an additional direct tiedown that runs forward at an angle not more than 45 degrees to the horizontal. This tiedown must pass either through the rear pipe of the upper tier or outside it and over both longitudinal tiedowns.

3.5.6 Securing Large Pipe, with an Inside Diameter over 1143 mm (45 in)

The front pipe and the rear pipe must be secured by blocking. All other pipe may be secured by blocking or wedges pushed firmly under the pipe. Each pipe must be secured by tiedowns through the pipe.

Direct tiedowns through each pipe in the front half of the load, which includes the middle one if there are an odd number, must run rearward at an angle not more than 45 degrees with the horizontal.

Direct tiedowns through each pipe in the rear half of the load must run forward at an angle not more than 45 degrees with the horizontal, to hold each pipe firmly in contact with adjacent pipe.

If the front or rear pipe is not also in contact with vehicle end structure, stakes, a locked pipe unloader, or other equivalent means, at least two direct tiedowns must be used through that pipe.

3.5.7 Conditions of Low Friction

Ice must be removed from concrete pipe before it is loaded

3.6 Intermodal Containers

3.6.1 Application

The rules in this section apply to the transportation of intermodal containers.

Cargo contained within an intermodal container must be secured in accordance with the provisions of Part 2 of this standard.

3.6.2 Transporting Intermodal Containers on Container Chassis *Vehicle(s)*

The intermodal container must be secured to the container chassis with securement devices or integral locking devices that cannot unintentionally become unfastened while the vehicle is in transit. The securement devices must restrain the container from moving more than 1.27 cm (1/2 in) forward, more than 1.27 cm (1/2 in) aft, more than 1.27 cm (1/2 in) to the right, more than 1.27 cm (1/2 in) to the left, or more than 2.54 cm (1 in) vertically. The front and rear of the container must be secured independently.

3.6.3 Transporting Intermodal Containers on Vehicles other than Container Chassis *Vehicle(s)*

All lower corners of the intermodal container must rest upon the vehicle, or the corners must be supported by a structure capable of bearing the weight of the container and that support structure must be independently secured to the motor vehicle.

All lower corners of intermodal containers must be secured to the vehicle by chains, wire rope, or integral locking devices. The front and rear of the container must be secured independently.

Each chain, wire rope, or integral locking device must be attached to the container in a manner that prevents it from being unintentionally unfastened while the vehicle is in transit.

3.7 Automobiles, Light Trucks and Vans

3.7.1 Application

The rules in this section apply to the transportation of automobiles, light trucks, and vans which individually weigh 4500 kg. (10,000 lb) or less.

Vehicles which are heavier than 4500 kg (10,000 lb) must be secured in accordance with the provisions of section 3.8 of this standard.

3.7.2 Requirements

1. Automobiles, light trucks, and vans shall be restrained at both the front and rear in the lateral, forward, rearward, and vertical direction using a minimum of two direct tiedowns.

2. Direct tiedowns that are designed to be affixed to the structure of the automobile, light truck, or van shall use the mounting points on those vehicles that have been specifically designed for that purpose.

3. Direct tiedowns that are designed to fit over or around the wheels of an automobile, light truck, or van shall provide restraint in the lateral, longitudinal and vertical directions. Edge protectors are not required for synthetic webbing at points where the webbing comes in contact with the tires.

3.8 Heavy Vehicles, Equipment and Machinery

3.8.1 Application

The rules in this section apply to the transportation of heavy vehicles, equipment and machinery which operate on wheels or tracks, such as front end loaders, bulldozers, tractors, and power shovels and which individually weigh 4500 kg. (10,000 lb.) or more.

Vehicles, equipment and machinery which is lighter than 4500 kg (10,000 lb.) may also be secured in accordance with the provisions of this section, with Section 3.7, or in accordance with the provisions of Part 2 of this standard.

3.8.2 Requirements

Accessory equipment such as hydraulic shovels must be completely lowered and secured to the vehicle.

The parking brake on the equipment being transported must be engaged, where applicable.

Articulated vehicles shall be restrained in a manner that prevents articulation while in transit.

3.8.2.1 Heavy Vehicles, Equipment or Machinery with Crawler Tracks or Wheels

Heavy equipment or machinery with crawler tracks shall be restrained in the lateral, forward, rearward, and vertical direction using a minimum of four direct tiedowns each having a working load limit of at least 2268 kg (5000 pounds).

The direct tiedowns shall be affixed at the front and rear of the vehicle, or mounting points on the vehicle that have been specifically designed for that purpose.

3.9 Flattened or Crushed Vehicles

3.9.1 Application

The rules in this section apply to the transportation of vehicles such as automobiles, light trucks, and vans which have been flattened or crushed.

3.9.2 Requirements

Flattened or crushed vehicles must be transported in such a manner that:

- the cargo does not shift upon the transport vehicle while in transit, and
- loose parts from the flattened vehicles do not become dislodged and fall from the transport vehicle.

The use of synthetic webbing to secure flattened or crushed vehicles is prohibited.

3.9.2.1 Securement of Flattened or Crushed Vehicles

Flattened or crushed vehicles shall be transported on vehicles which:

- have structural walls on four sides which extend to the full height of the load which extend to the height of the load and which block against movement of the cargo in the forward, rearward and lateral directions; or,
- have structural walls on three sides which extend to the full height of the load and which block against movement of the cargo in the forward, rearward and one lateral direction. In addition a minimum of two indirect tiedowns are required per vehicle stack with every tiedown having a minimum working load limit 2268 kg (5000 pounds); or,
- have structural walls on two sides which extend to the full height of the load and which block against movement of the cargo in the forward and rearward directions. In addition a minimum of three indirect tiedowns are required per vehicle stack with every tiedown having a minimum working load limit 2268 kg (5000 pounds); or,
- which employ a minimum of four indirect tiedowns per vehicle stack with every tiedown having a minimum working load limit 2268 kg (5000 pounds)

3.9.2.2 Containment of Loose Parts

Measures must be taken to ensure loose parts from flattened or crushed vehicles do not fall from the transport vehicle while in transit. Vehicles used to transport flattened or crushed vehicles must employ a containment system which prevents loose parts from falling from all four sides of the vehicle and which extends to the full height of the cargo. This system can be based on use of structural walls, sides or sideboards, or suitable covering material, alone or in combinations.

The use of synthetic material for containment of loose parts is permitted.

3.10 Roll-on/Roll-off Containers

3.10.1 Application

The rules in this section apply to the transportation of roll-on/roll-off and hook lift containers.

3.10.2 Requirements

Any container carried on a vehicle which is not equipped with an Integral Securement System must be:

- *blocked against forward movement by the lifting device, stops, a combination of both or other suitable restraint mechanism,*
- secured to the front of the vehicle by the lifting device *or other suitable restraint against lateral and vertical movement,*
- secured to the rear of the vehicle with at least one of the following mechanisms:
  - one indirect tiedown that secures the side rails of the vehicle chassis to and the container chassis at the same time;
  - two tiedowns installed lengthwise, each securing one side of the container to one of the vehicle's side rails; or
  - two hooks, or an equivalent mechanism, securing both sides of the container to the vehicle chassis at least as effectively as the tiedowns in the two previous items.

The mechanisms used to secure the rear end of a roll-on/roll off or hook lift container must be installed no more than two metres from the rear of the container. In addition, each mechanism must have a Working Load Limit of at least 2268 kg (5000 lb.) and be kept taut by adequate devices.

In the event that one or more of the front stops or lifting devices are missing, damaged or not compatible, additional manually installed tiedowns must be used to secure the container to the vehicle, providing the same level of securement as the missing, damaged or incompatible components.

3.11 Large Boulders

3.11.1 Application

This section applies to the transportation of any large piece of *natural, irregularly* shaped rock weighing in excess of 5 000 kg (11,000 lb.) or with a volume in excess of 2 cubic-meters on an open vehicle, or in a vehicle whose sides are not designed and rated to contain such cargo.

Pieces of rock weighing less of 5 000 kg (11,000 lb.) may be secured in accordance with this section, or in accordance with *the provisions of Part 2 of this standard*, including:

- contained within a vehicle which is designed to carry such cargo, or;
- secured individually by tiedowns, provided each piece can be stabilized and adequately secured.

Rock which has been formed or cut to a shape and which provides a stable base for securement may also be secured in accordance with the provisions of this section, or in accordance with the provisions of Part 2 of this standard.

3.11.2 Boulder Placement

Each boulder must be placed with its flattest and /or largest side down.

Each boulder must be supported on at least two pieces of hard wood blocking at least 10 cm x 10 cm (4 x 4 in) nominal side dimensions extending the full width of the boulder. Hardwood blocking pieces must be placed as symmetrically as possible under the boulder and should support at least 3/4 of the length of the boulder.

If the flattest side of a boulder is rounded or partially rounded, so that the boulder may roll, it must be placed in a crib made of hardwood timber fixed to the deck of the vehicle so that the boulder rests on both the deck and the timber, with at least three well-separated points of contact that prevent its tendency to roll in any direction.

If a boulder is tapered, the narrowest end must point towards the front of the vehicle.

3.11.3 Tiedowns

Tiedowns used to secure large boulders must be chain.

Indirect tiedowns which are in direct contact with the boulder should, where possible, be located in valleys or notches across the top of the boulder, or should be arranged to prevent sliding across the rock surface.

There are three arrangements that can be used, depending upon the shape of the boulder:

3.11.3.1 Cubic Shaped Boulder

The boulder must be secured individually with at least two chain tiedowns placed transversely across the vehicle. The aggregate working load limit of the tiedowns must be at least half the weight of the boulder.

The tiedowns must be placed as closely as possible to the wood blocking used to support the boulder.

3.11.3.2 Irregular Shaped Boulder - with stable base

The boulder must be secured individually with at least two chain tiedowns forming an "X" pattern over the boulder. The aggregate working load limit of the tiedowns must be at least half the weight of the boulder. The tiedowns must pass over the center of the boulder and must be attached to each other at the intersection by a shackle or other connecting device.

3.11.3.3 Irregular Shaped Boulder - with unstable base

Each boulder must be secured by a combination of chain tiedowns:

- One chain must surround the top of the boulder (between 1/2 and 2/3 of its height). The working load limit of the chain must be at least half the weight of the boulder.

- Four chains must be attached to the surrounding chain and the vehicle to form a blocking mechanism which prevents any horizontal movement. Each chain must have a working load limit of at least 1/4 the weight of the boulder. The angle of the chain must not exceed 45 degrees from the horizontal.

Part 4 - Definitions

Aggregate Working Load Limit	A calculation based on a summation of the working load limits or restraining capacity of all devices used to secure an article on a vehicle.
Anchor point	Part of the structure, fitting or attachment on a vehicle or cargo to which a tiedown is attached.
Article	A unit of cargo, other than a liquid or gaseous cargo, and includes articles grouped together so that they can be handled as a single unit or unitized by wrapping, strapping, banding or edge protection device(s).
Banding	A strip of material that may be used to unitize articles and is tensioned and clamped or crimped back upon itself. *(same as "Strapping")*
Bell Pipe	Concrete Pipe whose flanged end is of larger diameter than its barrel
Binder	A device used to tension a tiedown or combination of tiedowns.
Blocking	A structure, device or another substantial article placed against or around an article to prevent horizontal movement of the article.
Bolster	A transverse load bearing structural component, particularly a part of a log bunk.
Boulder	A large piece of natural rock that may be rounded if it has been exposed to weather and water, or is rough if it has been quarried.
Bracing	A structure, device or another substantial article placed against an article to prevent it from tipping, that may also prevent it from shifting.
Bulkhead	A vertical barrier across a vehicle to prevent forward movement of cargo.
Bundle	A group of articles of that has been unitized for securement as a single article.
Bunk	A horizontal bolster fitted with a stake at each end that together support and contains a stack of logs, and is installed transversely across a vehicle.
Bunk unit	A front bunk and a rear bunk that together cradle a stack of logs.
Cab shield	A vertical barrier placed directly behind the cab of a tractor to protect the cab in the event cargo should shift forward.
Cargo	All articles *or material* carried by a vehicle, including those used in operation of the vehicle
Chock	A tapered or wedge-shaped piece used to secure round articles against rolling.
Cleat	A short piece of material, usually wood, nailed to the deck to reinforce blocking.
Coil bunk	A device that keeps timbers supporting a metal coil in place.
Contained	Cargo is contained if it fills a sided vehicle, and every article is in contact with or sufficiently close to a wall or other articles so that it cannot shift or tip if those other articles are also unable to shift or tip.
Container Chassis Vehicle	A vehicle especially built and fitted with locking devices for the

	transport of intermodal containers.
Cradle	A device or structure that holds a circular article to prevent it from rolling.
Crosswise	*Same as "Lateral".*
Crown	The rounded profile of the top of a stack of logs, when viewed from the ends of the stack.
Cut-to-length logs	Included in shortwood.
Deck	The *load carrying area* of a truck, trailer or intermodal container.
Direct tiedown	A tiedown that is intended to provide direct resistance to potential shift of an article.
Dunnage	All loose materials used to support and protect cargo.
Dunnage bag	An inflatable bag intended to fill otherwise empty space between articles of cargo, or between articles of cargo and the wall of the vehicle.
Edge protector	A device placed on the exposed edge of an article to distribute tiedown forces over a larger area of cargo than the tiedown itself, to protect the tie-down and/or cargo from damage, and to allow the tiedown to slide freely when being tensioned.
Eye (of a cylindrical object)	The hole through the centre of the article.
Flatbed vehicle	A vehicle with a deck but no permanent sides.
Frame vehicle	A vehicle with skeletal structure fitted with one or more bunk units for transporting logs. A bunk unit consists of a front bunk and a rear bunk that together cradle logs. The bunks are welded, gusseted or otherwise firmly fastened to the vehicle's main beams, and are an integral part of the vehicle
Friction mat	A device placed between the deck of a vehicle and cargo, or between articles of cargo, intended to provide greater friction than exists naturally between these surfaces.
Gross Combination Weight Rating	The value specified for the vehicle by the "Manufacturer" as being the maximum of the sum of the "Gross Vehicle Mass" of the drawing vehicle plus the sum of the "Axle Loads" of all vehicles being drawn.
Gross Vehicle Weight Rating	The maximum laden weight of a motor vehicle as specified by the "Manufacturer".
Headboard	A vertical barrier across the front of the deck of a vehicle to prevent forward movement of cargo.
Hook-lift Container	A specialized container, primarily used to contain and transport materials in the waste, recycling, construction/demolition and scrap industries which are used in conjunction with specialized vehicles, in which the container is loaded and unloaded onto a tilt frame body by an articulating hook-arm.
Indirect tiedown	A tiedown whose tension is intended to increase the pressure of an article or stack of articles on the deck of the vehicle.
Integral Locking Device	A device which is purposely designed and used to restrain an article of cargo on a vehicle by connecting and locking attachment point(s) on the article to anchor point(s) on the vehicle.

Integral Securement System	A feature of roll-on/roll-off containers and hook-lift containers and their related transport vehicles in which compatible front and rear hold down devices are mated to provide securement of the complete vehicle and its cargo
Intermodal Container	A reusable, transportable enclosure that is especially designed with integral locking devices that secure it to a container chassis trailer to facilitate the efficient and bulk shipping and transfer of goods by, or between various modes of transport, such as highway, rail, sea and air.
Lateral	Sideways, transverse, crosswise or across a vehicle.
Lengthwise	*Same as "Longitudinal"*
Lift	A tier of dressed timber, steel or other materials.
Load binder	A binder incorporating an over-centre locking action.
Load capacity	The weight of cargo that a vehicle can carry when loaded to its allowable gross vehicle weight in a particular jurisdiction.
Logs	Include all natural wood that retains the original shape of the bole of the tree, whether raw, partially or fully processed. Raw logs include all tree species that have been harvested, with bark, and may have been trimmed or cut to some length. Partially processed logs have been fully or partially debarked, or further reduced in length. Fully processed logs include utility poles, treated poles, and log cabin building components.
Longitudinal	Lengthwise or along the length of a vehicle.
Longwood	All logs that are not shortwood, so are over 4.9 m (16 feet) long. Such logs are usually described as long logs or treelength.
Pallet	A platform or tray on which cargo is placed so that it can be handled as an article *(Same as "Skid")*
Pole Trailer	A trailer whose body consists simply of a drawbar by which the trailer is drawn.
Rail vehicle	A vehicle whose skeletal structure is fitted with stakes at the front and rear to contain logs loaded crosswise.
Restrained	An article that is not contained but is prevented from tipping or shifting.
Rub Rail	A rail along the side of a vehicle that protects the side of the vehicle from impacts.
Secured	Means that cargo is contained or restrained
Securing Device	Any device specifically manufactured as a means to attach or secure cargo to a vehicle or trailer.
Shackle	A U-shaped metal coupling link closed by a bolt.
Shift	A change in the longitudinal or lateral position or orientation of an article
Shoring bar	A structural section placed transversely between the walls of a vehicle to prevent cargo from tipping or shifting
Shortwood	All logs typically up to 4.9 m (16 feet) long. Such logs are often described as cut-up logs, cut-to-length logs, bolts or pulpwood. Shortwood may be loaded lengthwise or crosswise, though that

	loaded crosswise is usually no more than 2.6 m (102 inches) long.
Sided Vehicle	A vehicle whose cargo compartment is enclosed on all four sides by walls of sufficient strength to contain cargo, where the walls may include latched openings for loading and unloading, and includes vans and dump bodies, and includes a sided intermodal container carried by a vehicle.
Skid	A platform or tray on which cargo is placed so that it can be handled as an article.*(Same as "Pallet")*
Spacer	Material placed beneath an article, or between tiers of articles, to facilitate loading and unloading.
Stack	A single column of articles placed one above another.
Stack of logs	Means logs aligned parallel and heaped one upon others.
Stake	A member mounted close to vertical on a vehicle frame or as part of a bunk that serves to immobilize cargo placed against it.*(Same as "Standard")*
Stake Pocket	A female housing fixed to the side or ends of a vehicle to receive a stake or peg, and may also be used as an anchor point.
Standard	A member mounted close to vertical on a vehicle frame or as part of a bunk that serves to immobilize cargo placed against it.*(Same as "Stake")*
Strapping	A strip of material that may be used to unitize articles and is tensioned and clamped or crimped back upon itself *(Same as "Banding")*
Tarpaulin (tarp)	A waterproof sheet used to cover cargo.
Tiedown	A combination of securing devices which form an assembly that attaches cargo to, or restrains cargo on, a vehicle or trailer, and is attached to anchor point(s).
Tiedown assembly	*(Same as "Tiedown")*.
Tier	One layer of articles that are stacked one upon another.
Tip	An article falls over
Track	A set of plates on a tractor wheel that provide mobility for a tracked vehicle.
Tractor-pole trailer	A vehicle that carries logs lengthwise so that they form the body of the vehicle. The logs are supported by a bunk located on the rear of the tractor, and another bunk on the skeletal trailer. The bunks may rotate about a vertical axis, and the trailer may have a fixed, scoping, or cabled reach, or other mechanical freedom, to allow it to turn.
Transverse	*(Same as "Lateral")*
Twist lock	A device designed to support and fasten one corner of an intermodal container to a container chassis vehicle.
Unitized load	A number of articles grouped together with sufficient structural integrity that they can be handled, transported and secured as a single article.
Vehicle	A truck, a truck tractor, a trailer or a semitrailer individually or in combination.
Void Filler	Material used to fill a void between articles of cargo and the

	structure of the vehicle that has sufficient strength to prevent movement of the articles of cargo.
Wedge	A tapered piece of material, thick at one end and thin at the other.
Well	The depression formed between two cylindrical articles when they are laid with their eyes horizontal and parallel against each other.
Winch	A device for tensioning a webbing or wire rope tiedown that is fitted with means to lock the initial tension.
Working load limit (WLL)	The maximum load that may be applied to a component of a cargo securement system during normal service, usually assigned by the manufacturer of the component.

Part 5 - Cargo Securement Components: Referenced Standards

5.1 Vehicle Structure

Truck Trailer Manufacturers Association - RP 47

5.2 Anchor Points

Canadian Motor Vehicle Safety Standard (pending)

Truck Trailer Manufacturers Association - RP47

5.3 Platform Bodies (Flatdecks)

Truck Trailer Manufacturers Association - RP47

5.4 Van, Sided & Dump Bodies

Truck Trailer Manufacturers Association - RP47

Web Sling and Tiedown Association

Recommended Standard Specification for Interior Van Securement WSTDA-T5

5.5 Tiedowns

Web Sling and Tiedown Association

Recommended Standard Specification for Synthetic Webbing Tiedowns WSTDA-T1

Recommended Standard Specification for Winches Used With Synthetic Web Tiedowns WSTDA-T3

Recommended Standard Specification for Interior Van Securement WSTDA-T5

5.6 Webbing Assemblies

Web Sling and Tiedown Association

Recommended Standard Specification for Synthetic Webbing Tiedowns WSTDA-T1

Recommended Operating, Care and Inspection Manual for Synthetic Web Tiedowns WSTDA-T2

Recommended Standard Specification for Synthetic Webbing Used for Tiedowns WSTDA-T4

5.7 Chain Assemblies

National Association of Chain Manufacturers

Welded Steel Chain Specifications

5.8 Wire Rope and Attachments

Wire Rope Technical Board

Wire Rope Users Manual

5.9 Synthetic Rope and Attachments

Cordage Institute:

CI-1301-96 Polyester Fiber Rope, 3 and 8 Strand Constructions

CI-1302A-96 Polyester/Polyolefin Dual Fiber Rope, 3 Strand Construction

CI-1302B-99 Polyester/Polyolefin Dual Fiber Rope, 8 Strand Construction

CI-1304-96 Polyester Fiber Rope, 3 and 8 Strand Constructions

CI-1305-96 Single Braided Polyester Fiber Rope, 12 Strand Construction

CI-1307-96 Polyester Fiber Rope, Double Braid Construction

CI-1307-96 Polyester Fiber Rope, High Performance Double Braid Construction

CI-1303-96 Nylon (Polyamide) Fiber Rope, 3 and 8 Strand Constructions

CI-1307-96 Nylon (Polyamide) Fiber Rope, Double Strand Construction

CI-1307-96 Nylon (Polyamide) Fiber Rope, High Performance Double Braid Construction

5.10 Strapping

American Society for Testing and Materials

Standard Specification for Strapping, Flat Steel and Seals (ASTM D3953-91)

5.11 Clamps and Latches

International Standards Organization - 668.

5.12 Roll-on/Roll-off Containers

American National Standards Institute

Mobile Wastes and Recyclable Materials Collection, Transportation, and Compaction Equipment - Safety Requirements (ASC Z245.1 -1999)

Waste Containers - Safety Requirements (ASC Z245.30 -1999)

Waste Containers - Compatibility Requirements (ASC Z245.60 -1999)

Part 6 - Default Working Load Limits for Unmarked Tiedowns

6.1 Chain

Size	Working Load Limit
7 mm (1/4 in)	590 kg (1300 lb.)
8 mm (5/16 in)	860 kg (1900 lb.)
10 mm (3/8 in)	1200 kg (2650 lb.)
11 mm (7/16 in)	1590 kg (3500 lb.)
13 mm (1/2 in)	2040 kg (4500 lb.)
16 mm (5/8 in)	3130 kg (6900 lb.)
Chain Mark	PC
Examples	3 30

6.2 Synthetic Webbing

Width	WLL
45 mm (1-3/4 in)	790 kg (1750 lb.)
50 mm (2 in)	910 kg (2000 lb.)
75 mm (3 in)	1360 kg (3000 lb.)
100 mm (4 in)	1810 kg (4000 lb.)

6.3 Wire Rope (6 x 37, Fiber Core)

Diameter	WLL
7 mm (1/4 in)	640 kg (1400 lb.)
8 mm (5/16 in)	950 kg (2100 lb.)
10 mm (3/8 in)	1360 kg (3000 lb.)
11 mm (7/16 in)	1860 kg (4100 lb.)
13 mm (1/2 in)	2400 kg (5300 lb.)
16 mm (5/8 in)	3770 kg (8300 lb.)
20 mm (3/4 in)	4940 kg (10900 lb.)
22 mm (7/8 in)	7300 kg (16100 lb.)
25 mm (1 in)	9480 kg (20900 lb.)

6.4 Manila Rope

Diameter	WLL
10 mm (3/8 in)	90 kg (205 lb.)
11 mm (7/16 in)	120 kg (265 lb.)
13 mm (1/2 in)	150 kg (315 lb.)
16 mm (5/8 in)	210 kg (465 lb.)
20 mm (3/4 in)	290 kg (640 lb.)
25 mm (1 in)	480 kg (1050 lb.)

6.5 Synthetic Fiber Rope

Diameter	WLL
10 mm (3/8 in)	185 kg (410 lb.)
11 mm (7/16 in)	240 kg (530 lb.)
13 mm (1/2 in)	285 kg (630 lb.)
16 mm (5/8 in)	420 kg (930 lb.)
20 mm (3/4 in)	580 kg (1280 lb.)
25 mm (1 in)	950 kg (2100 lb.)

6.6 Steel Strapping

Width-thickness inch	WLL
1-1/4 x 0.029	540 kg (1190 lb.)
1-1/4 x 0.031	540 kg (1190 lb.)
1-1/4 x 0.035	540 kg (1190 lb.)
1-1/4 x 0.044	770 kg (1690 lb.)
1-1/4 x 0.050	770 kg (1690 lb.)
1-1/4 x 0.057	870 kg (1925 lb.)
2 x 0.044	1200 kg (2650 lb.)
2 x 0.050	1200 kg (2650 lb.)